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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/748,778	12/29/2003	Ralph R. Dammel	2003US313	8220

7590

07/26/2005

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EXAMINER

LEE, SIN J

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 07/26/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/748,778

Applicant(s)

DAMMEL, RALPH R.

Examiner

Sin J. Lee

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 03 May 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-3,5,6,8,9 and 11-35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3,5,14-27,30,31,34 and 35 is/are rejected.
- 7) ☒ Claim(s) 2,6,8,9,11-13,26,28-30,32 and 33 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 5-6-05
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____

DETAILED ACTION

1. Applicants canceled claims 4, 7, and 10.
2. In view of the amendment of May 3, 2005, previous rejection on claims 1-33 under 35 U.S.C. 112, second paragraph is hereby withdrawn.
3. In view of amendment of May 3, 2005, previous 102(b) rejection on claims 1-4, 14-27, 30 and 31 is hereby withdrawn.

Claim Objections

4. Claims 2, 26 and 30 are objected to because of the following informalities: In each of claims 2, 26, and 30, fourth line from the bottom, applicants need to change "and mixtures" to --- or mixtures ---. Appropriate correction is required.
5. Claims 6 and 9 are objected to because of the following informalities: In each of claims 6 and 9, first line, applicants need to change "claim 1" to --- claim 2 ---.
6. Due to new grounds of rejections, the following rejections are made *non-final*.

Claim Rejections - 35 USC § 112

7. Claim 25 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 25 depends from claim 1, which is a *composition claim*. However, claim 25 is written in *process claim language* thus rendering the scope of the claim indefinite.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

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8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

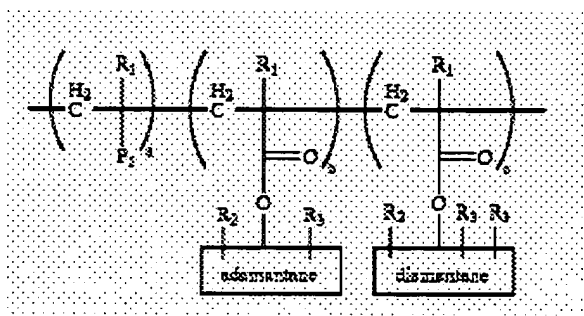
A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

9. Claims 1-3, 5, 14, 25-27, 30, 31, 34 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Liu et al (US 2005/0074690 A1).

Liu teaches (see abstract) a positive photoresist composition, which contains a base resin made from the monomers containing acid-cleavable, pendant higher adamantane, such as diamantane or triamantane. Liu also teaches ([0185]) that his photoresist composition can furthermore include a photoacid generator such as an iodonium salt or a sulfonium salt. Therefore, the prior art teaches present inventions of claims 1 and 14.

In [0026], Liu teaches following formula for his base resin



, and in his Example 9, Liu synthesizes a diamantane methacrylate (which is one of examples for the monomer that forms the third repeat unit of the base resin shown

above). Therefore, the prior art teaches present inventions of claims 2, 3, 25-27, 30, and 31.

In the formula shown above, Liu teaches –OH as one of only five examples for the R₃ group which can be attached to the diamantine ring (see [0029]). Since there are only several choices, one skilled in the art would immediately envisage –OH as Liu's R₃ group. Also, in [0047] and Fig.25A-B, Liu teaches that a lactone group may be part of the diamantine ring. Therefore, the prior art teaches present inventions of claims 5, 34, and 35.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

11. Claims 15, 16, and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US 2005/0074690 A1) in view of Nozaki et al (5,910,392).

With respect to present claim 15, as explained above in Paragraph 9, Liu teaches the use of a sulfonium salt as his photoacid generator, and as evidenced by Nozaki (col.8, lines 65-67, col.9, lines 1-30 and Example 7), triphenylsulfonium trifluoromethane sulfonate is one of the mostly typically used photoacid generator in the art. One skilled in the art would be motivated to use a very well known photoacid generator such as triphenylsulfonium trifluoromethane sulfonate as Liu's photoacid generator because Liu

already teaches that a sulfonium salt can be used as his photoacid generator. Thus, Liu in view of Nozaki would render obvious present invention of claim 15.

With respect to present claim 16, Liu teaches forming the photoresist layer on a surface of the substrate, imagewise exposing to radiation having a wavelength of 193 nm or 157 nm or to e-beam or an x-ray beam (see [0146]-[0150]), and then developing the exposed photoresist using a developer such as tetramethylammonium hydroxide. (see [0184]). Although Liu does not explicitly teach the present steps of pre-bake or post-bake, such steps are typically known in the art to be carried out in a resist pattern forming process, as evidenced by Nozaki, col.15, lines 17-23, lines 45-51 (Nozaki teaches the post-exposure baking step to be done in the temperature of 100-150°C by using a hot plate for 60-120 seconds). It would have been obvious to one skilled in the art to carry out the pre-bake step to remove solvent from Liu's photoresist solution formed on the substrate and to carry out the post-bake step to cause the acid-cleavable group of Liu's polymer to undergo a deprotection reaction catalyzed by the acid (which is produced from his photoacid generator). Thus, Liu in view of Nozaki would render obvious present inventions of claims 16 and 18-22.

12. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US 2005/0074690 A1) in view of Nozaki et al (5,910,392) as applied to claim 16 above, and further in view of Fahey et al (5,736,301).

Although Liu does not teach the use of an antireflective film on his substrate, it is very well known in the art, as evidenced by Fahey, col.1, lines 45-51, to provide an antireflective coating between a photoresist and a substrate to dramatically reduce the

number of artifacts in the patterned photoresist. Thus, it would have been obvious to one skilled in the art to include an antireflective coating between Liu's photoresist and his substrate to dramatically reduce the number of artifacts in the patterned photoresist. Therefore, Liu in view of Nozaki, and further in view of Fahey would render obvious present invention of claim 17.

13. Claims 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Liu et al (US 2005/0074690 A1) in view of Nozaki et al (5,910,392) as applied to claim 16 above, and further in view of Grunswald et al (4,701,390).

Although Liu is silent about the post development curing step, such post-development curing step is well known in the art, as evidenced by Grunswald, col.1, lines 36-40, to enhance the adhesion of the photoresist to the substrate. Therefore, it would have been obvious to one skilled in the art to subject Liu's developed photoresist to a post-development curing step in order to enhance the adhesion of his photoresist to the substrate. Thus, Liu in view of Nozaki and further in view of Grunswald would render obvious present inventions of claims 23 and 24.

Allowable Subject Matter

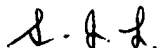
14. Claims 6, 8, 9, 11-13, 28, 29, 32, and 33 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Liu (either alone or in combination with other cited prior arts) does not teach or suggest present monomer unit of (1B) or (1C), present compound of claim 28 or 29, present polymer of claim 32 or 33.

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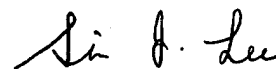
15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is 571-272-1333. The examiner can normally be reached on Monday-Friday from 9:00 am EST to 5:30 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly, can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



S. Lee
July 20, 2005



SIN LEE
PRIMARY EXAMINER